

REMARKS

Claims 1, 55, 61 and 66 are amended. New claims 73 and 74 are added.

Claims 1-3 and 45-74 are pending in the application.

Claims 1-3 and 45-60 stand rejected under 35 U.S.C. § 103(a) either as being unpatentable over Dunlop, U.S. Patent No. 5,590,389 as combined with Kiiski, U.S. Patent No. 5,623,726 or, in the case of claims 50 and 53, as being unpatentable over Dunlop as combined with Kiiski in further view of Drauglis, U.S. Patent No. 4,374,717. The Examiner is reminded by direction to MPEP § 2143 that a proper obviousness rejection has the following three requirements: 1) there must be some suggestion or motivation to modify or combine reference teachings; 2) there must be a reasonable expectation of success; and 3) the combined references must teach or suggest all of the claim limitations. Claims 1-3 and 45-60 are allowable over the cited combinations of Dunlop, Kiiski and Drauglis for at least the reason that the references, individually or as combined, fail to disclose or suggest each and every limitation in any of those claims.

As amended independent claim 1 recites a target surface having an absence of detectible precipitates, an average grain size of less than about 1 micron, and a substantially uniform structure and texture at any location. The amendment of claim 1 is supported by the specification at, for example, page 6, lines 18-30; page 2, lines 1-5; page 7, lines 31-32; page 8, lines 6-11; and page 25, lines 27-35. Dunlop discloses targets comprising aluminum alloys having grains less than about 20 microns, copper alloys having grains less than about 30 microns, or titanium alloys having grains less than 10 microns (col. 3, ll. 65 through col. 4, ll. 9). Dunlop additionally discloses a specific alloy that can have "a grain size of approximately 1 micron" (col. 8, ll. 3-10). Dunlop further indicates that the disclosed targets have precipitates regions less than about 2 microns (col. 4, ll. 7-9 and

col. 5, ll. 63 through col. 6, ll. 2). Dunlop does not disclose or suggest the claim 1 recited absence of detectible precipitates. Additionally, Dunlop does not disclose or suggest the claim 1 recited average grain size of less than about 1 micron.

As set forth in applicant's specification at, for example, page 8, line 6 through page 9, line 8, the recited average grain size of less than about 1 micron confers distinct advantages to the claimed target. As discussed, the submicron structure provides a high strength target which, as shown in Fig. 2, exceeds the yield strength and ultimate tensile strength of aluminum alloy AA6061 which is widely used for fabrication of backing plates. The high strength conferred to the target allows targets, including large monolithic target, to be fabricated and utilized without a backing plate. This feature can avoid steps in target/backing plate assembly formation such as soldering or diffusion bonding that are often difficult and time consuming. As further noted, the achieved target strengths are not attainable with prior art methods and confer prolonged sputtering target life. Accordingly, claim 1 is not rendered obvious by Dunlop.

Kiiski discloses stainless steel sheets formed by rolling and use of gas atomization such that a distribution of alloying element will be fully homogenous in a rolled material (col. 2, ll. 64 through col. 3, ll. 1). Kiiski does not disclose or suggest the claim 1 recited sputtering target surface having an absence of detectible precipitates or the recited average grain size less than about 1 micron. As indicated at page 5 of the present action, Drauglis is cited to show sputtering targets containing nickel or silver. Drauglis does not disclose or suggest the claim 1 recited target surface having an absence of detectible precipitates or the recited average grain size of less than about 1 micron. As combined, Dunlop, Kiiski and Drauglis fail to disclose the claim 1 recited sputtering target having a target surface with an absence of detectible precipitates and an average grain size of less

than about 1 micron. Accordingly, independent claim 1 is not rendered obvious by the cited combination of Dunlop, Kiiski and Drauglis and is allowable over these references.

Dependent claims 2-3 and 45-54 are allowable over the various cited combinations of Dunlop, Kiiski and Drauglis for at least the reason that they depend from allowable base claim 1.

As amended independent claim 55 recites a sputtering target comprising an average grain size of less than about 1 micron, a yield strength of greater than 50 mega Pascal, and an ultimate tensile strength of greater than 125 mega Pascal. The amendment to claim 55 is supported by the specification at, for example, page 8, line 6 through page 9, line 8 and Fig. 2. As discussed above, not one of Dunlop, Drauglis and Kiiski disclose or suggest the recited average grain size of less than about 1 micron. Additionally, not one of Dunlop, Drauglis or Kiiski disclose or suggest the claim 55 recited target having a yield strength of greater than 50 mega Pascal and an ultimate tensile strength of greater than 125 mega Pascal. As combined, Kiiski, Drauglis and Dunlop fail to disclose or suggest the claim 55 recited target having a yield strength of greater than 50 mega Pascal, an ultimate tensile strength of greater than 125 mega Pascal, and an average grain size of less than 1 micron. Accordingly, independent claim 55 is not rendered obvious by the combination of Dunlop, Kiiski and Drauglis and is allowable over these references.

Dependent claims 55-60 are allowable over the cited combinations of Dunlop, Kiiski and Drauglis for at least the reason that they depend from allowable base claim 55.

Claims 61-65 stand rejected under 35 U.S.C. § 103 over various cited combinations of Dunlop and Kiiski as further combined with one of Nalepka, U.S. Patent No. 4,883,721; Takahashi, EP 0,882,813 and Siewert, U.S. Patent No. 4,466,940. Claims 61-65 are allowable over the various cited combinations of Dunlop, Kiiski, Takahashi, Siewert and

Nalepka for at least the reason that the references, individually or as combined, fail to disclose or suggest each and every limitation in any of those claims.

As amended, independent claim 61 recites a copper-comprising sputtering target having a surface with a substantial absence of detectible precipitates and an average grain size of less than about 1 micron. Independent claim 61 is not rendered obvious by Dunlop and Kiiski, individually or as combined, for at least reasons similar to those discussed above with respect to independent claim 1. Not one of Takahashi, Siewert or Nalepka disclose or suggest the claim 61 recited absence of detectible precipitates or the recited average grain size of less than about 1 micron. As combined, Dunlop, Kiiski, Nalepka, Takahashi and Siewert fail to disclose or suggest the claim 61 recited surface of a copper-comprising sputtering target having an absence of detectible precipitates and an average grain size of less than about 1 micron. Accordingly, independent claim 61 is not rendered obvious by the cited combinations of Dunlop, Kiiski, Takahashi, Nalepka and Siewert.

Claims 62-65 are allowable over the various cited combinations of Dunlop, Kiiski, Siewert, Nalepka and Takahashi for at least the reason that they depend from allowable base claim 61.

Claims 66-72 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Takahashi in view of Dunlop and Kiiski. As amended independent claim 66 recites a copper-comprising sputtering target having a yield strength of greater than 50 mega Pascal and an ultimate tensile strength of greater than 125 mega Pascal and having an average grain size of less than about 1 micron. Independent claim 66 is not rendered obvious by Dunlop as combined with Kiiski for at least reasons similar to those discussed above with respect to independent claim 55. Takahashi does not disclose or suggest the claim 66 recited average grain size of less than about 1 micron or the recited yield strength of

greater than 50 mega Pascal or the recited ultimate tensile strength of greater than 125 mega Pascal. As combined, Dunlop, Kiiski and Takahashi fail to disclose or suggest the claim 66 recited copper-comprising sputtering target having a yield strength of greater than 50 mega Pascal, having an ultimate tensile strength of greater than 125 mega Pascal and having an average grain size of less than about 1 micron. Independent claim 66 is therefore not rendered obvious by the cited combination of Dunlop, Kiiski and Takahashi and is allowable over these references.

Dependent claims 67-72 are allowable over the cited combination of Takahashi, Dunlop and Kiiski for at least the reason that they depend from allowable base claim 66.

New claims 73 and 74 do not add "new matter" to the application since each is fully supported by the specification as originally filed. Claims 73 and 74 are supported by the specification at, for example, page 8, line 6 through page 9, line 8 and Fig. 2.

For the reasons discussed above, claims 1-3 and 45-72 are allowable, and claims 73 and 74 are believed allowable. Accordingly, applicant respectfully requests formal allowance of pending claims 1-3 and 45-74 in the Examiner's next action.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING
RESPONSE TO DECEMBER 19, 2002 OFFICE ACTION

In the Claims

The claims have been amended as follows. Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

1. (Amended) A sputtering target made by a process including casting having a target surface with the following characteristics:

- a) substantially homogenous composition at any location;
- b) substantial absence of pores, voids, inclusions and other casting defects;
- c) substantial an absence of detectable precipitates;
- d) an average grain size of less than ~~about~~ 1 μ m; and
- e) substantially uniform structure and texture at any location.

56. (Amended) A sputtering target formed from a cast material and comprising:
a yield strength of greater than 50 mega pascal (MP), and an ultimate tensile strength of greater than 125 MP;

a substantial absence of pores, voids and inclusions; and
an average grain size of less than about 1 μm .

61. (Amended) A sputtering target comprising copper, formed by a process including casting, and having a target surface with the following characteristics:

- a) substantially homogenous composition at any location;
- b) substantial absence of pores, voids, inclusions and other casting defects;
- c) substantial an absence of detectable precipitates;
- d) an average grain size less than about 1 μm ; and
- e) substantially uniform structure and texture at any location.

66. (Amended) A sputtering target formed from a cast copper material and comprising:

a yield strength of greater than 50 mega pascal (MP), and an ultimate tensile strength of greater than 125 MP;

a substantial absence of pores, voids and inclusions; and
an average grain size of less than about 1 μm .